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Taxation of Financial Assets in Developing Countries

Christophe Chamley

The administrative cost of implicit taxes on financial assets - seigniorage, reserve requirements, lending targets, and interest ceilings - - is low. But the excess burden that stems from the misallocation of resources is probably a much higher fraction of revenues than that of other taxes.

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This paper - - a product of the Public Economics Division, Country Economics Department - is part of a larger effort in PRE to reform taxes in developing countries. Copies are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Ann Bhalla, room N10-055, extension 37699 (62 pages, with figures and tables).

In developing countries, most financial assets in formal markets are deposits at financial institutions. This potentially important tax base could be taxed at a low administrative cost.

When revenues of financial taxes are significant, implicit taxes dwa 2xplicit taxes. Chamley focuses on the implicit taxation of financial assets through seigniorage, reserve requirements, lending targets, and interest ceilings combined with inflation. The last instrument has often been overlooked, but it has generated more than a third of implicit revenues in some cases (Nigeria), by lowering the cost of government borrowing.

Tax revenues are difficult to measure because of regulations that prevent the use of market prices for computation and distort the meaning of some definitions. For some countries, the standard method of seigniorage grossly underestimates the revenue from financial taxation.

In Sub-Saharan countries, the impact of taxation is small and hard to detect when the financial burden is low. In countries with repeated experiences of high taxation, the impact has been substantial (more than 50 percent of revenues on the margin). In countries with more developed financial markets, such as Thailand or Indonesia, the excess burden of taxation is very large even for small values of the (implicit) tax rates.

The author discusses various sources of distortion but ignores potential impacts on the level of saving and the growth rate.

Although taxes on financial assets have a low administrative cost, the excess burden that stems from the misallocation of resources is probably a much higher fraction of revenues than that of other taxes.

TAXATION OF FINANCIAL ASSETS IN DEVELOPING COUNTRIES

by

Christophe Chamley*

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*Very useful comments by Sheetal Chand, Javad Khalilzadeh-Shirazi and Bela Balassa are greatly acknowledged. This paper is forthcoming in Javad Khalilzadeh-Shirazi and Anwar Shah, Eds., Tax Policy in Developing Countries, The World Bank, Washington, D.C.

I. INTRODUCTION

The topic of financial taxation in developing countries combines issues of growth, public finance and macroeconomics. It is of direct relevance for countries which have been subjected at times to large taxation of financial assets. These experiences were a direct consequence of an internal instability of the budget and the inability of standard taxes to fulfill budget requirements.

The taxation of money has attracted a huge number of studies which have mainly concentrated on the episodes of extremely high inflation rates such as in Latin American countries. In such occurrences, there was a sharp differentiation between the various types of financial assets. For example, the hyperinflation of Germany did not affect directly the taxation of assets traded in the stock market.

The structure of financial markets in many developing countries is such that the menu of financial assets is restricted to money as broadly defined. Inflation and regulations on the financial system (such as interest ceilings, or reserve requirements), have thus a strong impact on all financial savings, and not just on the money that is used for transaction. The importance of the impact on financial intermediation needs hardly to be stressed in economic development.

The impact of financial taxation depends very much on the stage of development. The same general economic principles will be at work everywhere, but the emphasis will depend on the context. Experiences of financial

liberalization will be different in Korea and Ghana. Most of the empirical material of this paper is drawn from Sub-Saharan countries where the broad definition of money encompasses most financial assets. This area has attracted less attention than Latin America or some Asian countries. Yet it offers simple and interesting case studies[1]. We will see that financial markets are not as well developed in Africa as in Latin America and Asia, and that lessons for policy in those continents do not necessarily apply for Sub-Sahara Africa.

The tax base and the fiscal instruments are introduced in the first section of the paper. The paper deals only with implicit taxes (such as reserve requirements) which dwarf the explicit taxes (such as taxes on interest incomes of financial institutions).

There is a strong distinction between tax rates and cash-flows of revenues to government. In order to introduce the empirical background, I have chosen to consider first the tax rates that are the consequences of regulations and inflation. The impact of the rate of return and the level of financial assets is analyzed in Section III both through comparisons across countries and through time series.

The issue of revenue measurement is taken up in Section IV. It includes the measurement of seignorage. Perhaps contrary to common opinion, this problem is not simple. It will be shown that the proper base of computation is often closer to M2 than to the monetary base. Once the base is

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[1]The taxation of financial assets in Sub-Saharan countries has also been analyzed in Chamley and Honohan [1990]. The contents of the two papers are somewhat different.

established, the computation of revenues still raises issues which are considered here.

The results of section III and IV are used for the analysis of the efficiency cost of taxation in Section V. This cost is found to be low when inflation is low (less than 25 percent), and very high when the inflation rate is moderate (between 60 and 100 percent). These costs are higher than those that can be derived from other studies (which have followed Cagan [1956]). This is explained by the fact that the taxation of financial assets affected financial savings (as well as transaction balances) which are respond significantly to large rates of taxes.

Most of the analysis of the efficiency cost is restricted to the impact on financial assets and uses the standard tools that were developed by Harberger and others. These estimates provide a lower bound of the costs. Other inefficiencies cannot be evaluated at this stage. However, these costs seem to come short of the "linchpin" effects of some theories of development. Since this topic may be revived by new models of endogenous growth, Section V provides also a brief discussion of the role of financial taxation in this context.

The final section concludes with some remarks on financial liberalization.

II. FISCAL INSTRUMENTS

The Base

The menu of financial assets in many developing economies includes currency, demand and time deposits, and in some cases deposits are specialized

institutions such as merchant banks or saving institutions. Stock markets are embryonic in the best of cases. Even in a country like Nigeria, the stock market is very thin and some of the main stocks have unchanged price quotes for weeks. Government bonds, which could provide the best risk guarantee and liquidity are not owned by individuals. As a matter of practical purpose, financial institutions are the main holders of the government debt (outside the Central Bank). Therefore, in many countries of low to middle income, and especially in Sub-Sahar Africa[2], the main base for financial taxation is the extended definition of money (M2).

Instruments

The fiscal instruments are divided in two groups, explicit and implicit taxes.

Explicit instruments include taxes on loans, interest income, VAT. They are defined by statutory rates which are stable; these rates are not immune to revisions, but not more frequently than other items in the tax code. The statutory rates are different from the effective rates, mainly because of a lack of indexation for inflation. Despite such shortcomings, the average values of the effective rates are in general small and their variations are dwarfed by those of the implicit taxes.

In African countries, explicit taxes are found mainly in the countries that have inherited a tax structure from France, namely Morocco, Tunisia, and the countries of the two CFA zones. Such taxes are also found in the

[2]The stock market plays an important role in a number of developing countries, especially in Asia. Also, private individuals own government bonds in these countries.

Philippines. They are insignificant in the other African countries and in Latin America.

Implicit instruments are the *raison d'etre* of taxes on financial assets. They seem to provide ready source of cash in time of crisis when the regular means of taxation are failing[3]. By definition these taxes do not appear in standard national accounts as tax revenues. Their effective rates are difficult to compute, highly variable and often cannot be predicted ex ante. Implicit taxes have been very large at times. The magnitude of their revenues has exceeded 100 percent of the tax base (per annum) in some cases. In this paper, I deal exclusively with the implicit instruments.

A brief review of the instruments is necessary at this point. These are

a) the issuance of currency (seigniorage),
b) reserve requirements (earning below market rates),
c) lending targets at non-market rates,
d) the combination of interest ceilings and inflation.

a. The issuance of new currency debases the money that is already in circulation, and the resulting inflation is a tax on the currency. This tax cannot be separated from the taxes on the institutions of financial intermediation because these institutions provide assets that are close substitutes for the currency. An essential aspect of this tax is that it operates through a capital loss on the existing currency. This raises some issues for the computation of revenues, which will be adressed in Section IV.

b. Reserve requirements that earn a rate below the market are equivalent to a tax on deposits. It is sometimes argued that they crowd funds

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[3]We will see that this appearance may be deceiving when the tax has a strong impact on the level of financial assets, and that high inflation rates may only generate if at all, a small increase of revenue.

out of the markets for private credits. This is correct, but the government could invest the proceeds of the reserves into investment project that earn a return, and pay depositors. Required reserves are therefore to be viewed as an implicit tax with a rate that is equal to the difference between the market rate and the rate paid on the forced borrowings[4].

c. Lending targets for preferred sectors (typically agriculture), are a sort of earmarked reserve requirements, and are equivalent to a tax on deposits which subsidize the lucky borrowers at preferential rates.

d. The last instrument on this list (ceilings *cum* inflation), has been often overlooked although it has been one of the most important tax instrument on financial institutions. An example is provided by the case of Nigeria before 1986: All loans were subject to interest ceilings at less than 12 percent. (Some requirements for specific sectors with lower rates, had also to be met). Given the ceilings on the private loans, and their inherent riskiness, the government bonds at a rate of 9 or 10 percent were very competitive. It is therefore no surprise that their fraction in banks's portfolios was well in excess of the liquidity requirements (in some cases more than 60 percent).

In order to highlight the effect of interest ceilings, consider the stylized case a regime with zero values for interest rates on loans and

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[4]The only (possibly minor) difference, is that by altering requirements on forced borrowings, the government can generate a cash-flow, for a temporary period, which exceeds substantially the implicit tax that is due to interest rate differential. Such a policy however, does not affect the present value of (implicit) tax revenues.

deposits, and a high inflation[5]. This situation is well approximated in some cases: for example, the inflation rate in Somalia was higher than 50 percent in 1980, when the deposit rate was constrained at a value of 7.5 percent. In such a regime, financial institutions will happily buy government bonds that pay a rate of return equal to zero since their risk is less than that of private bonds. The banks are not forced to hold government bonds, and the government is thus able to borrow "competitively" at no interest all the resources of the financial system, if necessary. In this case, the regime reproduces thast of a 100 percent reserve requirement. This example illustrates the overlap between different the economic effects of various the fiscal instruments, thus complicating their analysis and the measurement of revenues.

Note that ceilings on interest rates may have been left in place more by inertia than activist policy design. The regular course of events is that ceilings are in place because of general concerns about credit markets (sub-Sahara Africa), usurary laws (Thailand), and other factors. In normal times the ceilings may be binding, but their effect is relatively small[6]. When a fiscal crisis occurs, inflation rises, the ceilings are left in place, and their impact becomes very significant. The ceilings are then useful for government finances. However they also subsidize private loans, thus imposing a greater burden on depositors per unit of revenue to the government than taxes on deposits or reserve requirements.

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[5]The loan and deposit rate are assumed to be equal, for the sake of simplicity. In this stylized example there is no operating cost of the financial instritutions.

[6]There is always the well known escape of the compensating balances.

III. IMPACT OF TAXATION ON FINANCIAL DEEPENING

III.1. Effects of Taxes and Regulations

The discussion of financial taxation is often confusing because of the multiplicity of instruments, which are intertwined and serve similar purposes. Taxes and regulations on financial institutions need to be analyzed through their effect on incentives and credit allocation.

The main impacts of the fiscal instruments that were described in the previous paragraphs are

- the taxation of the holders of financial assets through a lower rate of return. This effect operates on the level of available funds.
- the allocation of the available funds to borrowers through price incentives and rationing.

Financial institutions are by definition extremely highly leveraged. Deposits represent more than 90 percent of their assets; operating costs may reach 6 or 7 percent of the assets. These ratios are small when the effective tax rate on assets exceeds 30 or even 100 percent. Taxes and regulations have obviously affected the profitability of banks[7], but the brunt of the tax burden has been borne by depositors.

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[7]In Nigeria banks were heavily subsidized between 1984 and the september 1986, when they collected interest-free deposits towards import licences, which they were allowed to invest in T-bill earning between 9 and 10 percent.

III. 2. Tax Rates

The definition and measurement of effective tax rates is relatively easy when compared to the determination of revenues. The standard method is to impute values for real interest rates on assets that would prevail in a no-tax equilibrium, and to define the effective tax rates by the gap between actual real rates and no-tax rates. The only problem here is the difference between *ex ante* and *ex post* values. The first are relevant for incentive effects, but in most cases we can compute only the second. The evaluation of this issue depends on the particular context. (We will encounter the same situation in the revenue analysis). When the inflation rate is constant, the two values are identical. In other cases there may be some discrepancy, but I think that it does not present too much difficulty, provided that one is aware of the difference[8].

III.3. Empirical Evidence

III.3.a Cross Section in Sub-Sahara

The standard measure of financial deepening for developing economies is defined by the ratio between money broadly defined (usually M2) and nominal GDP. This is a crude measure since it aggregates assets that serve different purposes of transaction and saving, and have different interest elasticities. However, as a first approximation it has been a useful indicator. Cross-sections and time series provide two types of evidence on the relation between taxation and the level of financial assets.

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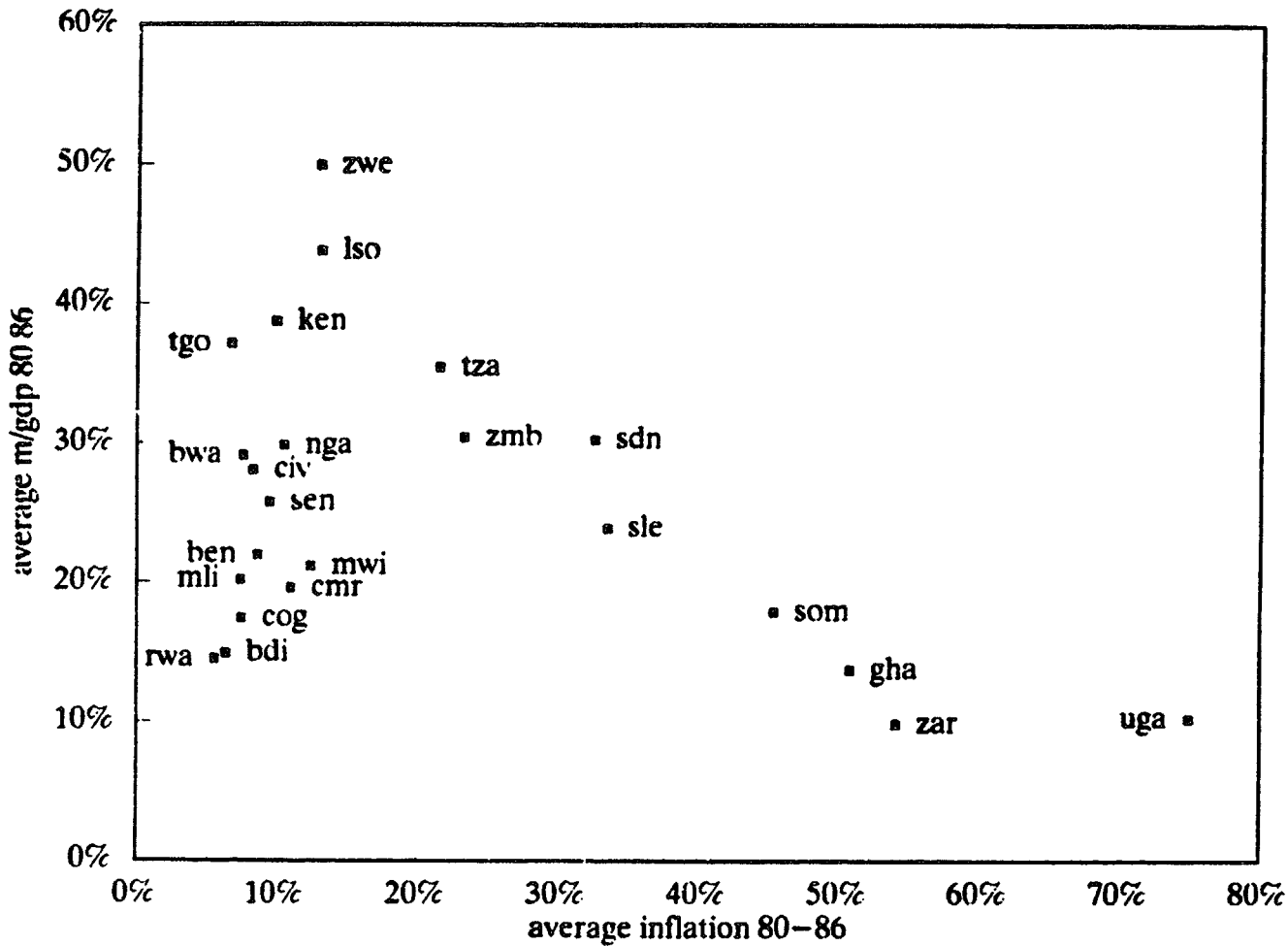
[8]The distinction between *ex ante* and *ex post* is essential in well developed asset markets.



Source: World Bank

FIGURE 1a

The sub-saharan countries form a set that is sufficiently homogenous (compared to other samples), for comparisons across countries. We can expect that the data will show a relation between the level of financial deepening and the "inflation environment" in the medium term. Hence, it is more relevant to look for a relation between averages of inflation rates and averages of M2 to GDP ratios. This data is represented in Figure 1a for almost all sub-saharan countries[9].

The figure presents a striking pattern: countries can be divided in two groups, non CFA and CFA[10], respectively. All non CFA countries are found near a schedule that shows an inverse relation between inflation and financial deepening. The only exceptions are Rwanda, Burundi, and Malawi, which have low inflation and low financial deepening. This apparent anomaly is easily explained by differences of urbanization ratios. Whereas all the other countries have ubanization ratios between 17 and 30 percent[11] (except for Uganda, with 7 percent), the urbanization ratios for these three countries are 2%, 2% and 5%, respectively.

The second group is formed by the CFA countries: they have experienced low inflation on average, (because of the institutional restraints on the creation of money), but their level of financial deepening is lower than in

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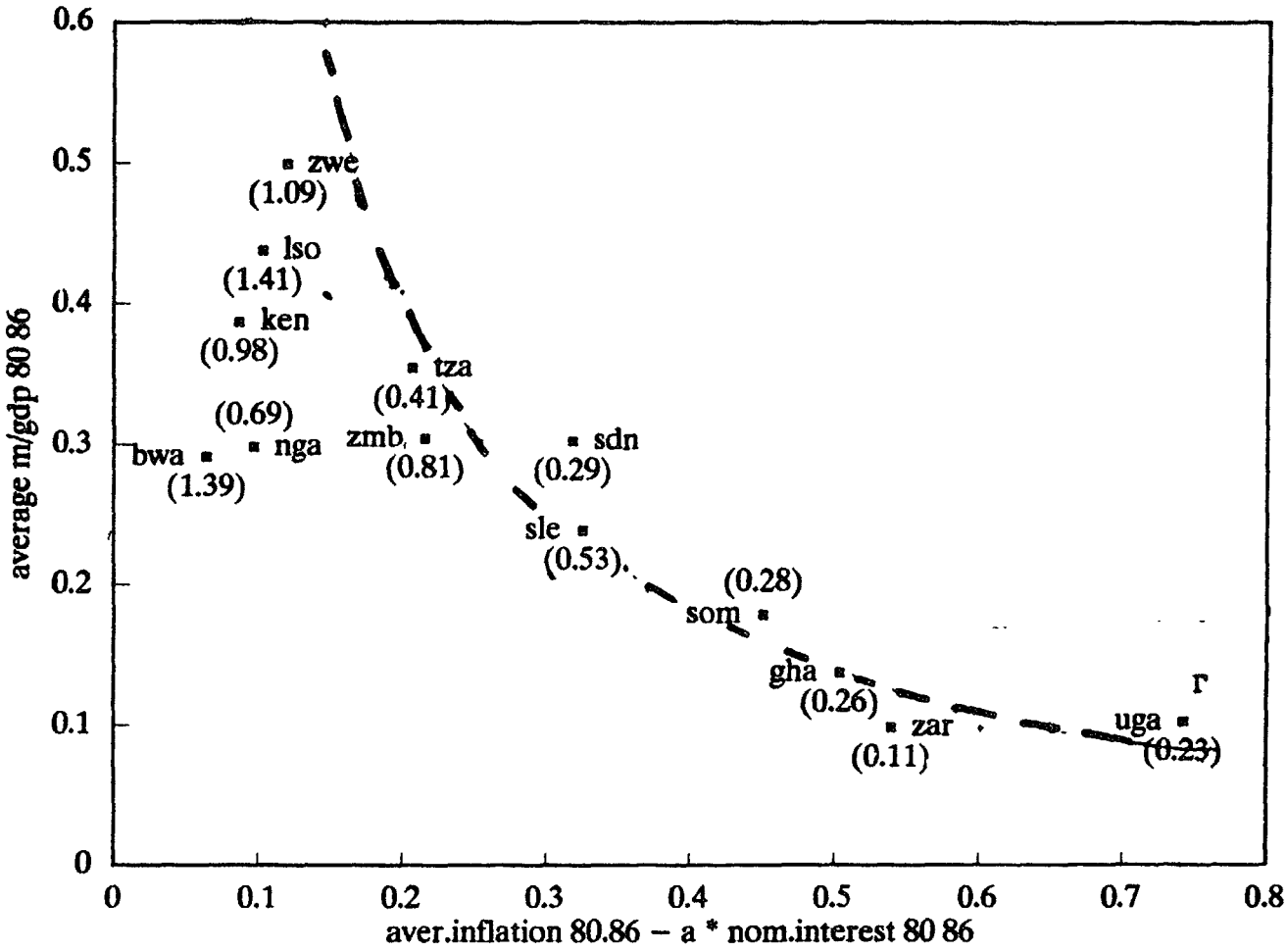
[9]The missing countries (among the reporting members), are Ethiopia, Madagascar, Liberia, and some of the countries in the CFA zones that would be redundant with the data in the Figure (Burkina Faso, Chad, Niger)

[10]CFA countries belong to one of the two currency zones with a fixed parity with the french franc (a constant nominal exchange rate since 1953), and specific constraints on monetary policy, (see Honohan [1990]).

[11]Word Development Report, 1988.



a = average quasi money/gdp 80–86. ( ) average quasy money/money 80–86.

FIGURE 1b

the non CFA countries with low inflation[12]. This difference is not explained by the urbanization ratios, which are not lower than average. One possible explanation is that the special monetary system facilitates for some countries a financial intermediation through european institutions. This issue is beyond the scope of the present study[13].

The representation of the data is repeated in Figure 1b for the sub-sample of non CFA countries[14]. The Figure shows that the effect of inflation on the level of financial assets is weak when this inflation rate is less than 20 percent on average (Botswana, Nigeria, Kenya, Lesotho, Zimbabwe). This could be explained by fixed costs of substitution between financial and other assets.

The inverse relation between inflation and assets is strong when the inflation rate is in the range of 30 to 60 percent (on average). The ratios between quasi-money (M2-M1), and money (M1), are also reported for each country in the diagram. One can observe that that in this range of inflation rates, the taxation of financial assets has a strong impact on the level of quasi-money, which is used as means of savings. The ratio of time deposits to

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[12]The exception is Togo with an index of financial deepening of 10 points more than in the all the other CFA countries; the difference is probably due to the inflow of funds from neighboring Ghana where inflation exceed 100 percent at the same time.

[13]It is noteworthy that in the cases of relatively low financial deepening, the shortfall of deposits is compensated by loans from the Central Bank to commercial banks, such that the credit to GDP ratio in a country such as d'Ivoire is not much different from say, Kenya. The relatively high deposits in Togo can be explained by a substitution from the highly taxed Ghana.

[14]An adjustment is made here for the interest that is paid on time deposits. This adjustment is negligible because most interest rates were fixed during the period. This is confirmed by a comparison with Figure 1a.

money (demand deposits plus currency outside banks) is relatively high for countries with low inflation (ratios in Kenya and Zimbabwe are near 100 percent), and low in the countries with high inflation such as Ghana, Zaire, and Uganda, where it is less than 30 percent.

The strong response of broad money to high inflation is is an essential aspect of the taxation of money (broadly defined) in Sub-Sahara Africa. Broad money is used for saving purposes. Numerous studies have shown that this type of asset is more sensitive to rates of return than money that is used for transactions. Indeed some have argued that this should be taken into account in the design of efficient taxes on financial assets[15]. They were by and large no such differential rates for financial assets in Sub-Sahara Africa before 1986, and taxes on assets not used for transaction, when high, had a large impact on their level.

At the other end of the spectrum of financial assets, other data show that the impact of inflation on the level of currency is weaker, and becomes significant only for very high inflation rates such as in Ghana between 1978 and 1983.

The implication of this situation was that the high inflation rates did not generate large increases of revenues. The measurement of these revenues is a complex issue which will be addressed in the next section, but we can take here an approximation which multiplies the base by the inflation rate minus a correction for the handling of the accounts (which is fixed arbitrarily at 5 percent[16]). The locus of points where revenues are equal to

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[15]See Fry [1981].

[16]Such choice is not critical.

6 percent of GDP is represented by the curve Γ. One can verify that it fits rather well the data for the countries with high inflation. This fit is not a strong proof that high inflation does not bring more revenues. But it is an indication that the increase of revenue is not large. In the range of 30 to 60 percent, an increase of the inflation rate does not generate on average, much higher levels of revenues. It is however, quite possible that very high inflation rates generate large revenues for short periods. This evidence will be compared with the time series data.

III.3.b Time Series: High Inflation in Sub-Sahara

I now turn to the four countries that have experienced the higher levels of taxation on financial assets in sub-sahara Africa, which are by increasing order, Somalia, Ghana, Zaire (see Figure 1a)[17]. These are the countries where one can expect the most significant impact of taxation on financial intermediation and on financial deepening. The evolution of inflation and the monetary aggregates in represented in Figures 2a to 2c.

The response of the level of assets is measured through the estimation of an error correction model[18].

Demands for Financial Assets

The error correction model is composed of two equations of the form

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[17]The data for Uganda was too poor to be usable at this stage.

[18]Ordinary least squares equations with lagged dependent variables generate estimates of the long-term interest elasticity that are much overstated.

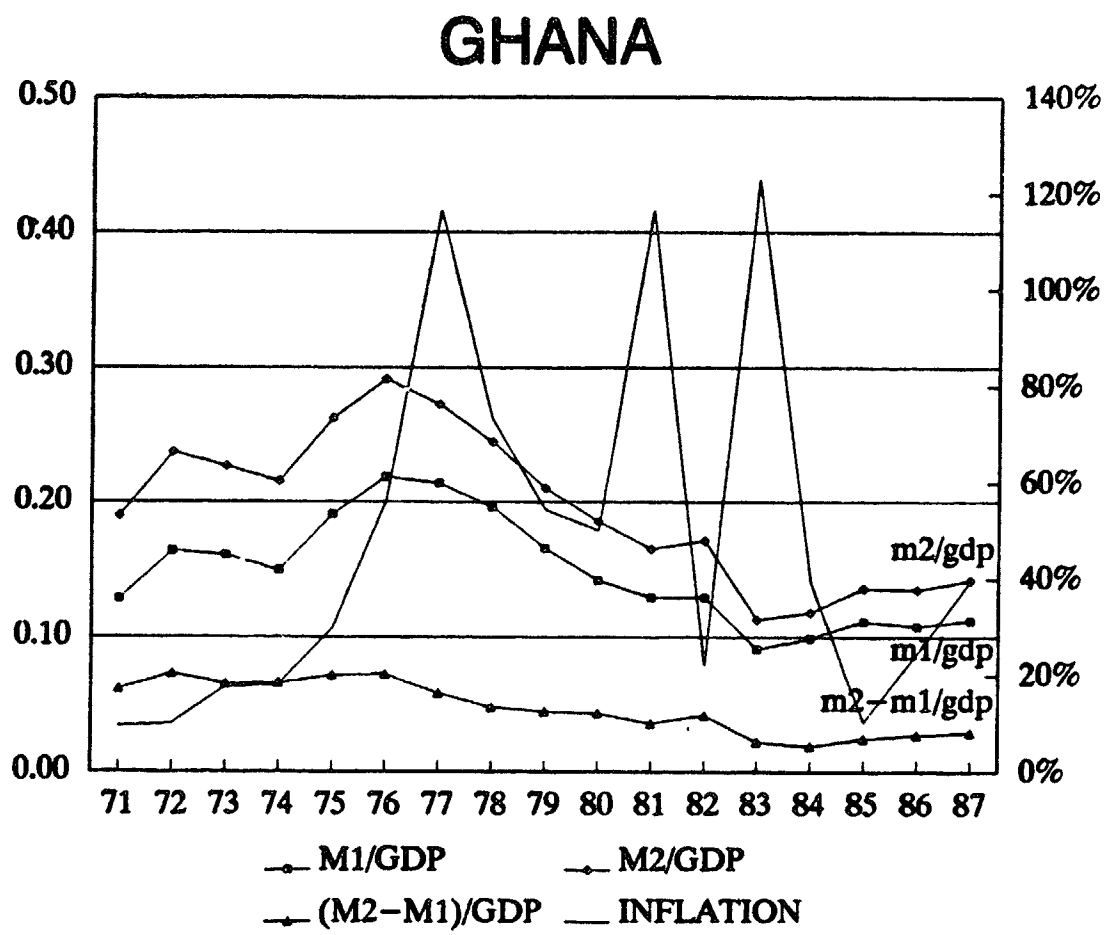
GHANA
0.50
0.40
0.30
0.20
0.10
0.00
140%
120%
100%
80%
60%
40%
20%
0%
m2/gdp
m1/gdp
m2-m1/gdp
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87
M1/GDP
M2/GDP
(M2-M1)/GDP
INFLATION

FIGURE 2a

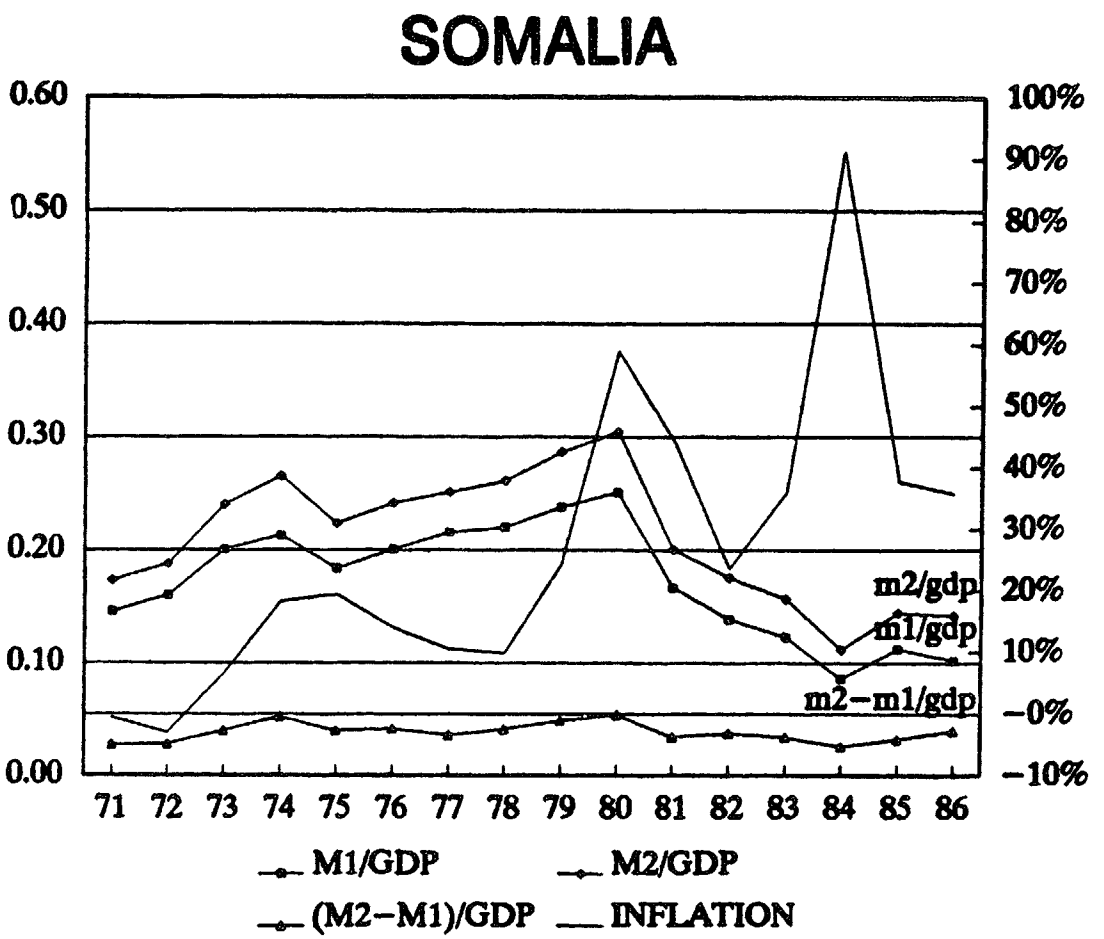
SOMALIA
0.60
0.50
0.40
0.30
0.20
0.10
0.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
-0%
-10%
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86
m2/gdp
m1/gdp
m2-m1/gdp
M1/GDP
M2/GDP
(M2-M1)/GDP
INFLATION

FIGURE 2b

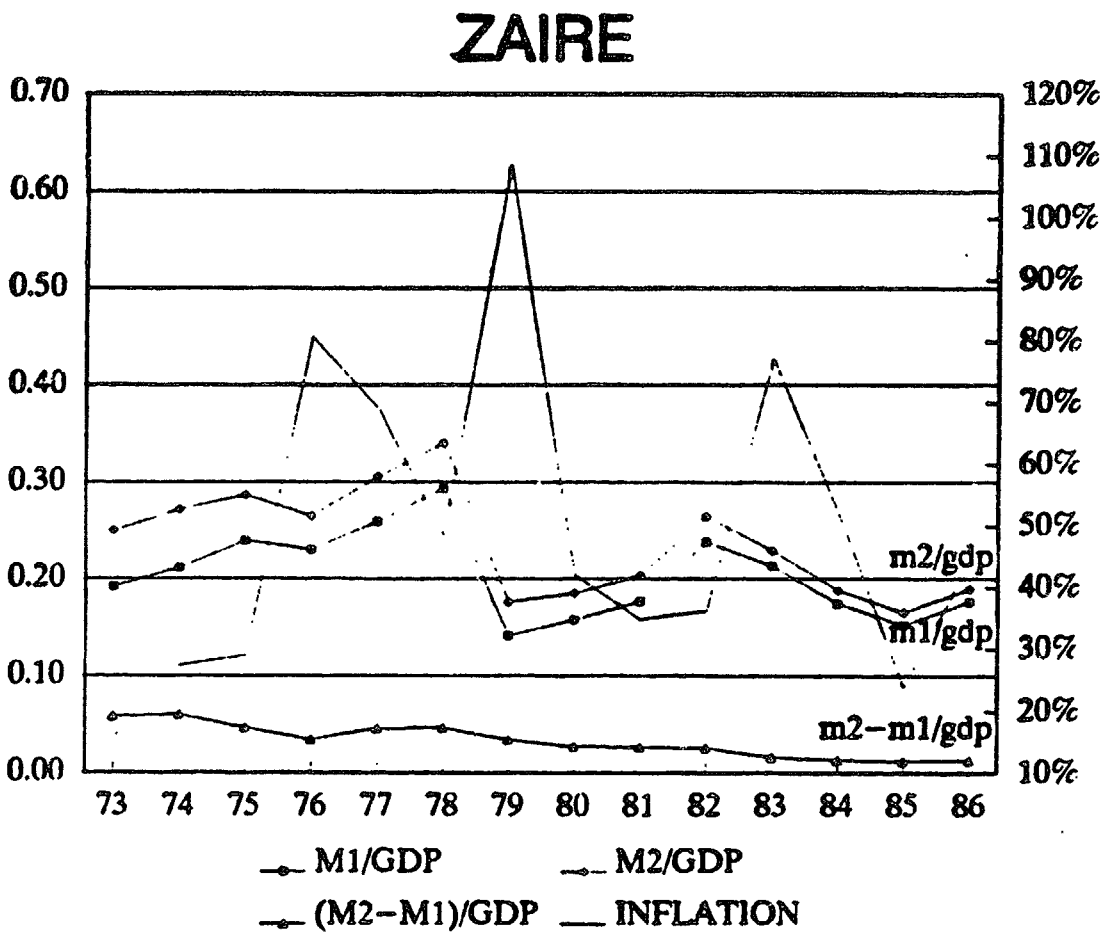
ZAIRE
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
120%
110%
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
m2/gdp
m1/gdp
m2−m1/gdp
73 74 75 76 77 78 79 80 81 82 83 84 85 86
M1/GDP
M2/GDP
(M2−M1)/GDP
INFLATION

FIGURE 2c

(1) $Lm = C_1 + \alpha\pi + \beta Y + e$, with the notation

M is the financial assets,

Lm = Log(M/P), P is a price index (CPI),

Y = Log(y), y = Real GDP,

π is the inflation rate

e is the residual of the estimation,

(2) $DLm = C_2 + aDY + b_0 D\pi + b_1 D\pi_{-1} + cDLm_{-1} + \delta e + \epsilon$,

with the notation

$DLm = Lm - Lm_{+1}$,

e is the same residual as in equation (1), and ϵ is the residual of the estimation of the second equation.

The financial asset M, was chosen to be M2. The results of the estimation (ith intrumental variables) for Somalia and Zaire are presented in Table 1. The case of Ghana is more complex because of the numerous changes of policy regimes and two episodes of demonetizations that cannot easily be captured by standard equations. A more in depth analysis is presented by Tsikata [1990]. During the periods of estimti n, the interest rate on time deposits was fixed. We can therefore equate the tax on financial assets to inflation. All equations show a significant inverse relation between the level of M2 and inflation.

Inspection of Figures 2a-c shows a moderate impact of inflation on time deposits for the three countries. This is confirmed by empirical estimations. This does not contradict the cross-section evidence in Figure 1 which showed a

large development of quasi-money in low inflation countries. The high levels of taxation in the three countries of the sample have prevented the growth of time deposits. This effect cannot be detected in the time series data. This is another illustration of the difficulty in using econometric models in the evaluation of policy impacts for countries that in regimes of transition.

TABLE 1

Demands for Financial Assets

Level Equation

	Somalia	Zaire
α	-.52 (1.85)	-.53 (1.68)

Adjustment Equation

	Somalia	Zaire
a	.66 (2.09)	
b0	-.47 (2.34)	-.46 (2.6)
b1	.54 (2.28)	
c	.88 (3.2)	.23 (.83)
δ	-.49 (2.6)	-.35 (1.84)
$\bar{R}2$	.62	.58

III.3.c. Moderate Inflation in Sub-Sahara

The case of country that has experienced episodes of moderately high inflation is found in Nigeria. The time series data is represented in Figure

2d, where a relation between asset levels and inflation is hard to detect. No such relation was found to be significant in the estimation of an error correction model. This evidence is in agreement with the cross-section results of the previous section.

IV. MEASUREMENTS OF REVENUES

IV.1 Revenues and Tax Rates

Financial taxes are often used by fiscal authorities when other taxes are failing (because of administrative costs, or macro-economic fluctuations). The main advantage of such taxes is the immediate cash-flow through the issuance of currency or debt. However, the tax impact on individual wealth operates through the capital value of the financial assets. This distinction is essential for any discussion of revenues.

Consider the simple case of seignorage: the government does not tax the currency. This is administratively expensive, and if it were feasible, there would be some other tax with a lower administrative cost. The government obtains revenues by issuing new currency which is equivalent to the "old" currency, and thus reduces its value through inflation. Individuals are taxed only when inflation occurs.

In a steady state, the rate of growth of money and the the inflation rate are constant, the velocity of money is constant, and the economic analysis is straightforward. However, this situation is hardly relevant for most countries, since the inflation tax is used as a last resort in a financial crisis. When inflation increases, the velocity of money decreases, the rate of inflation exceeds the rate of money creation and the measurement of tax

revenues by the product of inflation and the tax base exceeds the amount of actual revenues. The process is reversed when the rate of money creation slows down. When the issuance of money is highly variable, there is no close relation between the cash-flow of revenues through money creation and the inflation rate.

The relation between money creation and inflation is in fact more complex because of expectations about future expansions. The most striking illustration has been provided by Sargent and Wallace: a reduction of the rate of growth of money may generate a simultaneous increase of the inflation rate because of private expectations that the temporary short-fall of revenues will force higher rates of money expansion and inflation in the future. In general, the anticipation of high money growth in the future leads to an increase of the price level before the actual expansion. This induces a capital loss on current money holdings that does not generate any revenue for the government.

The problem of revenue measurement is not restricted to seignorage but it is an inherent feature of the taxation of financial assets. The timing of the price variations of the financial assets differs from that of the cash-flow, and depends on the type of policy and the sophistication of agents in financial markets.

IV.2. Methodology

There is no computation method that yields a reliable measure of revenues in all cases. I review the two main ones:

Method 1 (rate of return)

In this method various financial assets (currency, demand deposits, time deposits) are imputed with real rates of return which would prevail in an economy without financial taxation. The wedge between the imputed and the actual rate of return defines the effective *ex post* tax rate, and the implicit revenues are defined by the product of this rate with the level of the asset. The procedure is thus based on the computation of the effective rates of taxation. When the inflation rate is high, the choice of these values, which is always a little arbitrary, is not critical for the computation. There are two problems with this method:

(i) The discussion in the previous section showed that this measure may lead to incorrect results, even with perfect day to day data. This is the reason why seigniorage revenues are not computed in this way. In this respect the method generates poor (good) results when the inflation rate is highly variable (steady).

(ii) The method may introduce serious errors with the available data, which is often computed on an annual basis. These will be examined through numerical comparisons with the second method.

Method 2 (cash-flow)

This procedure computes the cash-flow that is generated by the expansion of assets for the government and other beneficiaries of financial regulations. It performs well with annual data, under some conditions. In some other situations (such as financial deepening with low inflation), it performs poorly. The most straightforward application of this method is in the computation of seignorage revenues.

Seigniorage

The cash-flow that is generated by an expansion of the monetary base dM is equal

$$(3) \quad R = \frac{dM}{P}$$

If the data on dM and P were available at every instant, the computation of revenues would be easy. However, the values of dM and P are reported only at discrete times. Moreover, the price index (often the CPI) may not be reflect the composition of government expenditures.

For this reason, most people use a measure such as in Fischer [1982], where the amount of revenues is estimated by the formula:

$$(4) \quad R' = \frac{\Delta M}{Y} ,$$

The term ΔM is the increment over a discrete period, and Y is the value of nominal GDP over the same period. The value of R' measures the ratio of real income from money creation over the real value of GDP for the period. For most developing countries the minimum period for the computation of GDP is one year. This formula uses standard national income data with no price index or deflator to produce a measure of real income and is thus very convenient. It gives an exact measure of real income when

- the velocity of money is constant, and
- the rate of growth of money are constant

during the period (one year).

However, when one of these two conditions is not satisfied, the formula is subject to errors. These are analyzed in Appendix 1, where it is shown that the bias may exceed 20 percent for some parameters. Methods 1 and 2 are compared in a synthetic example in Table 2 of the Appendix, where the money expansion is not uniform during the year, and takes place entirely in the second half of the year. The velocity of money increases by various amounts during this period of six months (as one would expect). One can see that the Method 1 leads to gross overestimates and is not appropriate in this case.

Other Financial Assets

We have seen that reserve requirements are equivalent to a tax on demand and time deposits. These are included in the base for the seigniorage revenues in formulae (3) and (4). However, the combination of low ceilings on nominal interest rates, high inflation and government borrowings (at the so-called "market rate") has the same effect for government revenues (with an additional rationing on private credit markets). Should then one include the expansion of the government debt in the term ΔM ? This correction is not even sufficient when credits to the private sector finance the arrears of the government (as it occurred in Nigeria). Is the expansion of M2 a better measure for revenues ? This would probably be a good procedure when interest ceilings are near zero and inflation is very high, but it is totally inappropriate when inflation is low, interest rates are slightly below zero, and financial assets grow because of a surge of the saving rate or financial deepening.

TABLE 3a

MEASUREMENTS OF TAX REVENUES

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	AVERAGES
GHANA																	
m2/gdp	0.180	0.202	0.208	0.192	0.226	0.251	0.221	0.194	0.196	0.162	0.137	0.155	0.097	0.097	0.114	0.113	NA
infl	0.095	0.100	0.176	0.181	0.298	0.560	1.164	0.731	0.544	0.500	1.164	0.222	1.228	0.396	0.103	0.245	0.630
Tax rate	0.064	0.067	0.136	0.140	0.236	0.426	0.764	0.531	0.414	0.383	0.759	0.175	0.790	0.310	0.071	0.187	0.438
Mes2	0.014	0.062	0.030	0.040	0.066	0.073	0.097	0.094	0.024	0.042	0.052	0.028	0.030	0.038	0.039	0.040	0.048
Mes1	0.011	0.013	0.028	0.027	0.053	0.107	0.169	0.103	0.081	0.062	0.104	0.027	0.076	0.030	0.008	0.021	0.068
Infl. (six years mov. av.)						0.235	0.413	0.518	0.580	0.633	0.777	0.721	0.732	0.676	0.602	0.560	0.621
Mes2 (six years av.)						0.047	0.061	0.067	0.066	0.066	0.064	0.056	0.045	0.036	0.038	0.038	0.054
Mes1 (six years av.)						0.040	0.066	0.081	0.090	0.096	0.104	0.091	0.075	0.063	0.051	0.044	0.076

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	AVERAGES
SOMALIA																	
m2/gdp	0.189	0.165	0.222	0.235	0.198	0.221	0.222	0.228	0.247	0.278	0.176	0.163	0.151	0.099	0.111	0.123	NA
infl	-0.00	-0.02	0.065	0.182	0.193	0.141	0.105	0.099	0.242	0.588	0.444	0.236	0.359	0.911	0.377	0.357	0.372
Mes2	-0.03	0.045	0.034	0.058	0.047	0.037	0.054	0.062	0.076	0.048	0.045	0.021	0.008	0.021	0.060	0.031	0.043
Tax rate	-0.00	-0.03	0.059	0.163	0.170	0.125	0.094	0.089	0.211	0.459	0.360	0.198	0.290	0.637	0.291	0.268	0.290
Mes1	-0.00	-0.00	0.013	0.038	0.033	0.027	0.021	0.020	0.052	0.128	0.063	0.032	0.043	0.063	0.032	0.033	0.049
Inflation (aver.)						0.091	0.109	0.131	0.160	0.228	0.270	0.286	0.328	0.463	0.486	0.447	0.291
Mes2 (aver.)						0.031	0.046	0.049	0.056	0.054	0.054	0.051	0.043	0.036	0.034	0.031	0.045
Mes1 (aver.)						0.017	0.021	0.025	0.032	0.047	0.052	0.053	0.056	0.064	0.060	0.044	0.045

TABLE 3b

MEASUREMENTS OF TAX REVENUES (continued)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	AVERAGES
ZAIRE																	
M2/GDP	0.209	0.220	0.215	0.238	0.273	0.228	0.248	0.280	0.171	0.149	0.168	0.209	0.184	0.162	0.146	0.154	NA
infl	0.057	0.157	0.1[illegible]3	0.274	0.290	0.806	0.690	0.484	1.086	0.420	0.349	0.362	0.771	0.522	0.238	0.644	0.536
Mes2	0.016	0.041	0.066	0.064	0.023	0.071	0.111	0.117	0.006	0.070	0.068	0.106	0.088	0.051	0.036	0.068	0.072
Tax rate	0.049	0.139	0.136	0.232	0.246	0.591	0.523	0.391	0.738	0.345	0.294	0.302	0.568	0.415	0.203	0.359	0.414
Mes1	0.010	0.030	0.029	0.055	0.067	0.135	0.130	0.109	0.126	0.051	0.049	0.063	0.104	0.067	0.029	0.055	0.078
																	0
Inflation (aver.)						0.290	0.395	0.450	0.605	0.629	0.639	0.565	0.579	0.585	0.444	0.447	0.534
Mes2 (aver.)						0.046	0.063	0.075	0.065	0.066	0.074	0.080	0.076	0.065	0.070	0.069	0.070
Mes1 (aver.)						0.054	0.074	0.087	0.104	0.103	0.100	0.088	0.084	0.077	0.061	0.061	0.086
																	0

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	AVERAGES
ZAMBIA																	
M2/GDP	0.285	0.244	0.236	0.225	0.295	0.294	0.332	0.297	0.276	0.283	0.270	0.318	0.330	0.320	0.269	0.237	NA
infl	0.060	0.050	0.064	0.080	0.101	0.187	0.197	0.163	0.096	0.117	0.139	0.124	0.196	0.200	0.374	0.516	0.212
Mes2	-0.03	0.013	0.060	0.012	0.029	0.063	0.029	-0.03	0.065	0.016	0.013	0.083	0.023	0.038	0.037	0.133	0.040
Tax rate	0.043	0.034	0.047	0.062	0.082	0.154	0.156	0.126	0.066	0.082	0.105	0.090	0.147	0.146	0.251	0.344	0.151
Mes1	0.012	0.008	0.011	0.014	0.024	0.045	0.051	0.037	0.018	0.023	0.028	0.028	0.048	0.046	0.067	0.081	0.043
Inflation (aver.)						0.090	0.113	0.132	0.138	0.144	0.150	0.140	0.139	0.145	0.192	0.258	0.155
Mes2 (aver.)						0.020	0.031	0.023	0.027	0.028	0.025	0.029	0.028	0.040	0.035	0.055	0.032
Mes1 (aver.)						0.019	0.025	0.030	0.031	0.033	0.034	0.031	0.030	0.032	0.040	0.050	0.034
																	0
Seigniorage	-0.04	0.012	0.020	-0.00	0.034	0.025	-0.00	0.005	0.004	0.011	0.013	0.014	0.012	0.015	0.016	0.083	0.017
Seigniorage (aver.)						0.007	0.014	0.013	0.010	0.013	0.009	0.007	0.010	0.012	0.014	0.026	0.013

The computations are even more complicated when the debt pays an interest that is positive, but below the market. These issues are ignored in most studies that compute seignorage revenues. For some countries that rely only on reserve requirements and market interest rates, the standard measure is appropriate (subject to the errors mentionned above). In Sub-Sahara, and in other countries where interest rates have been regulated in an inflationary environment, measurement problems cannot be ignored.

IV.3. Examples

The evaluation of computation procedures depends on the policy background of the countries. Information on inflation, and the levels of money (M1 and M2) for the three countries was summarized in Figures 2a, 2b and 2c. Various measures of computation are presented for the three countries of the sample in Tables 3a and 3b, which also include the measurements for Zambia, and Figures 3a to c. The results illustrate some of the remarks in the methodological discussion.

Consider the case of Ghana first. The first period of high financial taxation occurred in 1976-1977, with inflation rates of 56 and 116 percent, respectively (Table 3a). The revenue from the tax according to Method 1, are equal to 10.7 and 16.9 percent of GDP for the same years. Now consider the cash-flow method (method 2), and include the entire expansion of M2 in the cash-flow (which is an upperbound of the revenues). This yields to revenues of 7.3 and 9.7 percent of GDP. Furthermore, these numbers may already be overestimates since the velocity of money accelerated in that period (see the analysis in Appendix 1 and Table 2). The results of the two procedures can

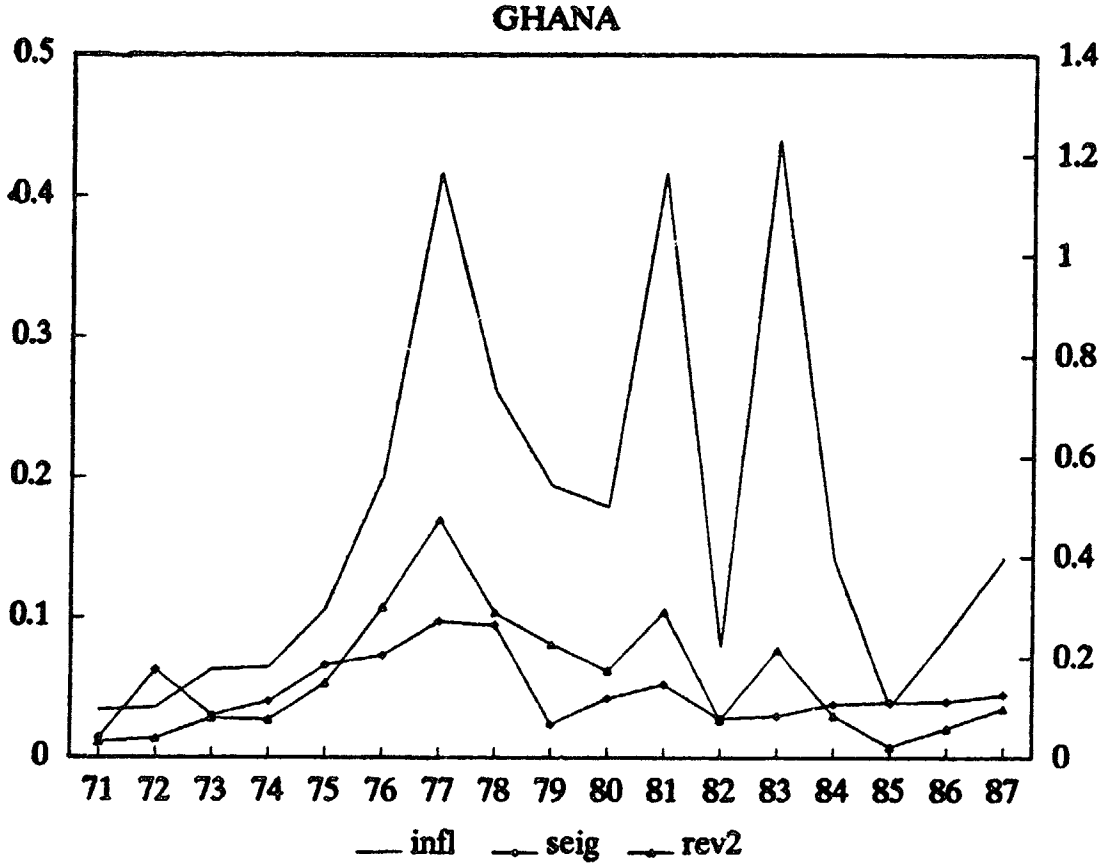
GHANA
0.5
0.4
0.3
0.2
0.1
0
1.4
1.2
1
0.8
0.6
0.4
0.2
0
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87
infl
seig
rev2

FIGURE 3a

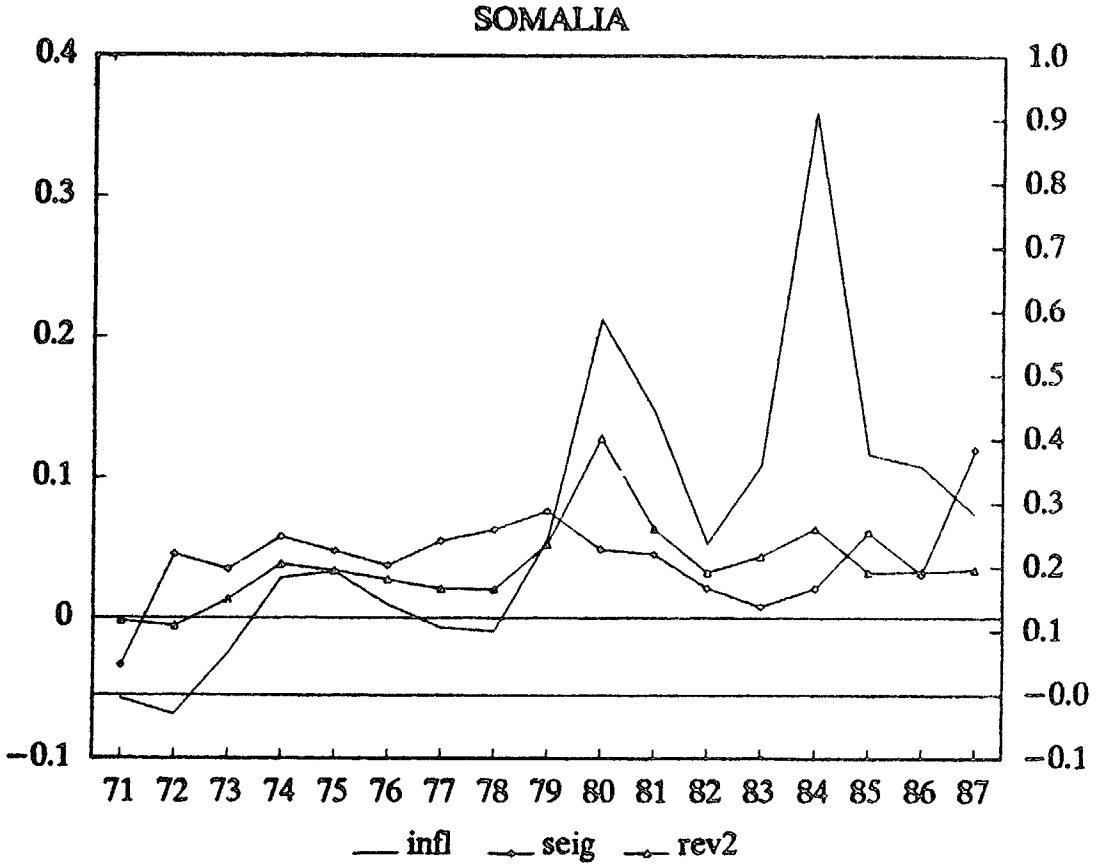
SOMALIA
0.4
0.3
0.2
0.1
0
-0.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
-0.0
-0.1
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87
infl
seig
rev2

FIGURE 3b

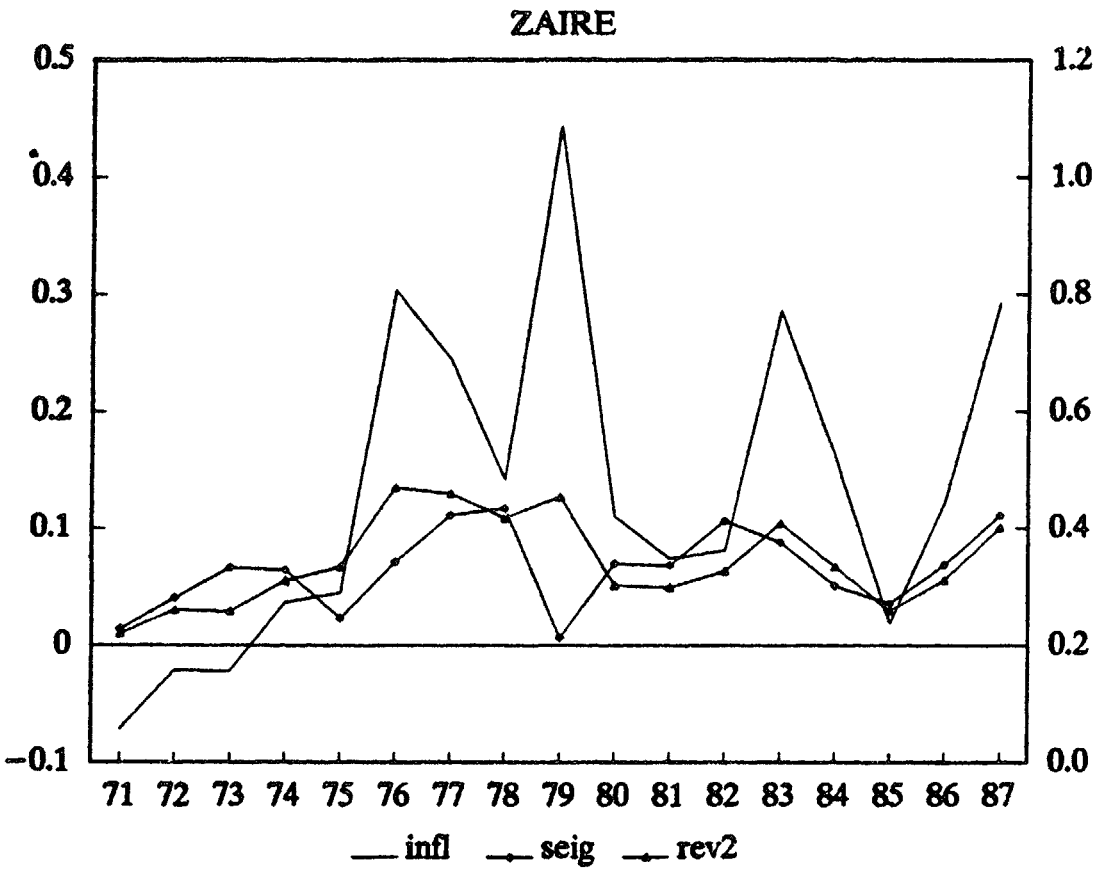
ZAIRE
0.5
0.4
0.3
0.2
0.1
0
-0.1
1.2
1.0
0.8
0.6
0.4
0.2
0.0
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87
infl
seig
rev2

FIGURE 3c

also be compared for the entire period 1971 to 1987: method 1 yields an average amount of 7.6 percent of GDP, which is almost the double of the second estimate of 4.2 percent[19]. This is not surprising in view of the large fluctuations of the inflation rate and the increase of the velocity of money.

The case of Somalia (Table 3b) presents similar properties. Inflation began to increase in 1979 (22%), peaked in 1980 (47%), and was still high in 1981 (37%). The *ex post* loss of income on financial assets as computed with method 1, were equal to 5.2 , 12.8, and 6.3 percent of GDP, respectively. For the same years the method 2 yields the values of 7.6, 4.8 and 4.5 percent. In both cases, we see that the first methods overstates the variations of revenues. The two methods yield averages for 1971-1987 in Somalia, that are equal to 4.9 and 4.3 percent of GDP. Note however, that method 2, which includes all of M2, may be an overstimate of the true revenue. This overestimation is especially relevant before 1980, which is a period of financial deepening with relatively low taxation. For those years the result of the first procedure is lower than that of the second, sometimes by 4 percentage points.

These examples can be repeated for other cases (Zaire in 1976, Table 3c)

V. EFFICIENCY COST OF TAXATION

The most important distortions of taxation and regulations on financial institutions concern the level of deposits and the allocation of the available

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[19]An accurate accounting would add to both results the revenues from the outright demonetizations that occurred in this period.

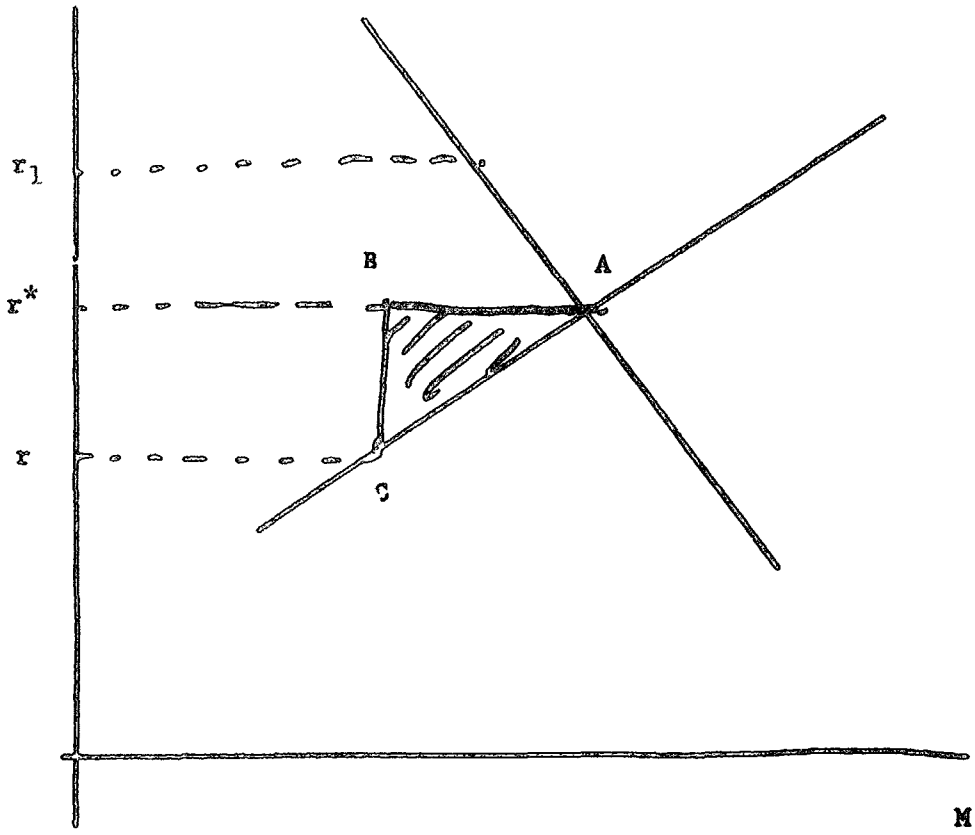

FIGURE 4

funds in credit markets. Regulations do affect the efficiency of the operations of financial institutions. However, as was pointed at before, the variations of the banks' margins of operating costs (less than 5 percent of the deposits) are small with respect to these two effects (when the effective tax rate is greater than 50 percent).

There are four types of efficiency costs in the taxation of financial assets, as implemented in developing economies, (i) the reduction of the level of financial assets in the formal sector and the substitution towards other markets (informal, foreign), (ii) distortions in the allocation of the available assets because of regulations such as interest ceilings, (iii) interactions between taxes and existing imperfections in the credit markets, (iv) the impact on the level of saving and the intertemporal allocation of resources.

For the first three types, the level of total capital is fixed. This is the situation of a static economy or an economy on a growth path (which may be balanced), with an exogenous capital accumulation. We will see that the first source of distortion is sufficient is many cases to show that the efficient cost is very high compared to the revenues collected, and probably higher than the cost of standard taxes for many countries. Even when the first source of distortion is small (i.e., when the supply of financial assets is relatively inelastic), the costs of the next two types can also be substantial.

The efficiency cost of the last type is a little more controversial. In any case, its mechanism is very different because it works through the impact on capital accumulation and the effect of capital accumulation on growth. Its analysis deserves separate consideration.

V.1. Efficiency Cost in a Static Economy (or on an exogenous balanced growth path)

V.1.a. Taxation

In the simple model of analysis (Figure 4), the demand schedule depends on the marginal productivity of investment and the supply schedule depends on the alternative uses of funds for depositors. These uses may include consumption (in particular of durables), foreign or informal capital markets. Note th[illegible]e may be some interaction between the demand and the supply schedu[illegible]nds are reallocated from banks to the informal market, the demand for loans in the formal market may decrea[illegible]e.

A tax on deposits or loans introduces a wedge between the lending and the deposit rate. This wedge creates an efficiency cost that is measured by the area of the Harberger triangle. A nice property of the analysis is that it requires only information on the elasticities of the demand and the supply of funds. This point should be stressed: no description of the alternative uses of funds (informal market, consumption, of others) is necessary, provided that there are no distortion on these markets, i.e. when there are no special motives for policy intervention in these different activities. These activities may present some inefficiencies when compared to intermediation in the formal market. But they coexist with the formal financial market and present possibilities for economic substitution because some or their inefficiencies are compensated by advantages. As an example, informal credit market may offer less risk diversification, but they provide some special relation between lender and borrower which improves the monitoring capability.

This application of the standard tool of excess-burden also accomodates the interaction between the demand and the supply schedules: the demand and supply function do not depend only on the rate of return, *ceteris paribus*. As the tax reduces the rate of return on deposits in the formal market, the substitution towards the informal sector reduces the demand for loans in the informal sector. The effect of this interaction is a flatter demand schedule for loans, in comparison the schedule *ceteris paribus*. The efficiency cost of the tax is measured by the observed changes of demand and supply that are induced by the tax.

A lower bound of the efficiency cost is given by the area of the triangle ABC which is equal to

$$E = (1/2)\Delta r \Delta D \quad ,$$

where Δr and ΔD are the reduction of the interest rate and of the level of deposit, respectively, which are induced by the tax. This expression is useful for two reasons: first, there is often little information on the interest elasticity of the demand for loans. Second, in some important cases, this expression is likely to capture most of the efficiency cost. To see this, the expression of E can be rewritten:

$$E = (1/2)(r^*-r)\Delta D,$$

where r^* and r are the real rates of return with no tax and with a tax, respectively.

The amount of the underestimation is equal to

$$A = (1/2)(r_1-r^*)\Delta D,$$

where r_1 is the marginal productivity of investment when the tax is in place. When the effective tax wedge is large, the value of the real net rate r is negative, large in absolute terms, and the term interest gap r*-r is probably larger than the difference r_1-r^*.

Marginal Efficiency Cost

The Harberger formula shows that the efficiency cost is of the second order with respect to the tax rate, and therefore with respect to the amount of tax revenue. However, since the average efficiency cost increases linearly with the tax rate, the value of the marginal cost increases with the tax wedge, and may reach levels that are significant. Consider a small change of the net ra-te of return of financial assets, which has an impact dD on the level. The marginal effciency cost is equal to

$$MEB = (r^* - r)dD.$$

Revenues (implicit of explicit) are equal to $(r^* - r)D$, and the marginal change of revenues is equal to

$$dR = (r^* - r)dD - Ddr .$$

The marginal efficiency cost per unit of revenue is obtained by the ratio of these two expressions:

$$(5) \quad MEC = \frac{(r^* - r)[-D'(r)/D(r)]}{1 - (r^* - r)[D'(r)/D(r)]}$$

Note that the term $-D'$ is positive since D' has a negative sign. As expected, the marginal efficiency cost increases with the interest gap r^*-r, and with the response $-D'$[20].

When the demand for financial assets is of the form (1), the expression (5) becomes

$$(6) \quad MEC = \frac{(r^*-r)\alpha}{1 - (r^*-r)\alpha}$$

Empirical Estimates

The discussion in Section III showed that when the level of taxation is low, there is little observed impact on the level of financial assets. This may be because of the noise of other determinants of financial deepening, or because of the effect is genuinely weak. However, we have seen that for the countries with high taxation, the effect is strong. The measurements of Section III can now be used in formula (5) to evaluate the marginal efficiency cost. The results are presented in Table 4 for the three countries with high

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[20]This formula is an approximation since it is derived by a simplified partial equilibrium analysis. For small tax rates, this formula may be a good approximation of the efficiency cost of inflation in general equilibrium, (Chamley [1985]).

inflation. These numbers are complemented with others from a previous study on financial liberalization in South East Asia[21].

The values of the efficiency cost depend on the assumption about the inflation rate (in the first column). They are higher than those that are obtained by estimation of the demand for money (transaction) in industrialized economies (Cagan [1956]). This properties was discussed already in Section III.

Table 4 The Efficiency Cost of Taxation

Country	Inflation Rate	MEC
Somalia	60%	.43
Zaire	60%	.43
	100%	1.0
	200%	∞
Thailand	5% a/	.58
Indonesia	13% a/	1.19

Notes:

All values are in percentage points.

a/ This value is the difference between the average real rats before and after the liberalizations. (For more discussion see Chamley and Qaizar, [1989]).

Comparison with the Cross-Section Evidence

[21]Chamley and Hussain [1989].

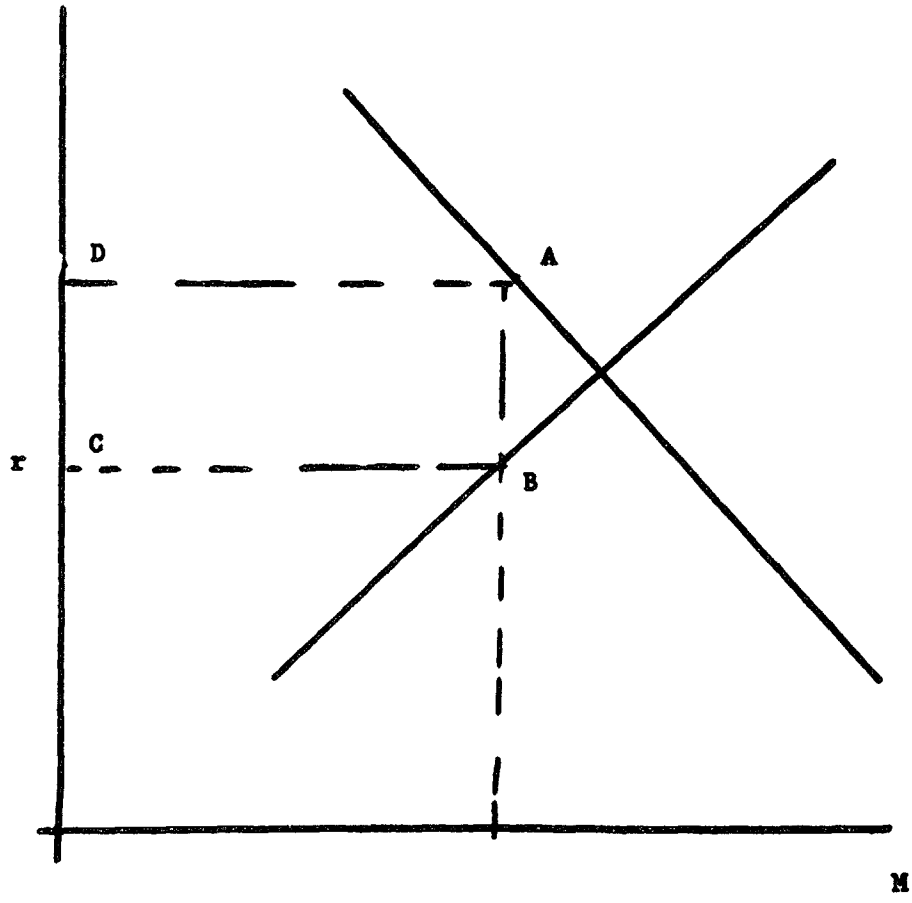

FIGURE 5

The values of the efficiency cost that are obtained here are smaller than what was indicated by the cross-section analysis. Note that in the cross-section, there was hardly any gain of revenues when the inflation rate ranged between 50 and 100 percent, which is the relevant intererval for the three countries. Indeed, there are some good reasons to believe that the time series results underestimate the true elasticities in developing economies where a process of financial deepening is stopped by high inflation.

In the sub-saharan countries with moderate and low inflation, financial deepening (as measured by the ratio between financial assets and GDP) progressed gradually since the early 1970. The growth of saving and time deposits was important in this process and required an environment of stability. There are some fixed costs associated to the development of the financial sector. In an environment of high taxes, there is no growth of financial assets for a saving purpose, and the money in circulation is used mainly for transaction. This motive is less sensitive to the rate of return on money (currency to GDP ratios are typically not very sensitive to inflation rates in the range of 40 to 60 percent). One can therefore expect that time series estimates will show relatively low interest elasticities of the demand for money. The problem here is that models of linear equations such as (1) may be somewhat deficient for economies which undergo the structural changes associated with economic development.

This discussion implies that the values of Table 4 should thus be regarded as conservative estimates.

V.1.b Interest Ceilings and Allocations in Credit Markets

Interest ceilings have two effects on credit markets, discriminations against risky investment projects, and rationing. As the interest ceiling is lowered gradually from the market equilibrium rate, the first effect occurs immediately. The second effect does not occur at the same time.

Risky projects are discriminated against because the ceilings apply uniformly to loans in all projects and do not make allowance for the risk premium and different probabilities of default. The effect is very similar to that of the corporate tax in the standard Harberger model where a fixed amount of capital is allocated between two sectors. When this effect occurs, lenders allocate funds on the margin to the riskless sector, (where the rate of return is equal to the ceiling). There is no general rationing, although some of the more risky sectors may be excluded because they are beyond the margin. The implication of the Harberger model is that the efficiency cost is only of the second order with respect to the implicit tax rate.

When the ceiling is sufficiently low, or all projects identical, rationing may occur. This rationing creates rents and may lead to an inappropriate allocation of the available funds. The maximum efficiency cost of the rationing is thus represented by the area ABCD in Figure 5. In general, there is no good information for a more precise evaluation of this cost. However, as an important property, it is of the first order with respect to the interest wedge.

V.1.c. Imperfect Markets

The previous analysis applied to an economy where the alternative to money holding is to invest in activities without distortions, i.e., where the

private rate of return is equal to the social rate of return. This assumption may not be valid in many cases, but there are only few cases where the nature of this distortion can be defined explicitly and evaluated for policy analysis. In one important case however such an analysis can be provided. We have noted already that for various reasons, capital markets are subject to imperfections in developing economies. As Shaw has pointed a long time ago, a consequence of these imperfections is that the purchase of investment goods (or any bulky item such as durables) requires the accumulation of cash balances prior to the purchase of the good. This is especially true in an economy without credit, but even when credit is available, the bank may finance only a fraction of the investment, and the rest is financed by the accumulation of cash balances[22].

Consider the problem of an investor that has no access to credit and has a positive cash-flow that is saved in money for the purchase of a durable good. The real value of this flow is assumed to be constant. Assume for simplicity that in an initial environment, there is no inflation and that the rate of return on deposit is nil. Now the inflation rate takes a positive value. Inflation acts like a tax on the durable good, and increases its effective cost. More remarkably, inflation will lead to an increase of the average level of the cash balance at every moment before the purchase[23].

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[22]Real goods provide an alternative to cash balances but this is probably an ineffective method of saving because of transaction costs.

[23] This can be seen by a recursive argument: assume that time is divided into periods, and that the cash-flow accrues at the end of the period. In the last period of the saving process, the purchase is made and its value is equal to the sum of the cash-flow in that period and the deposit balance at the end of the period. Inflation erodes the deposit balances and thus requires a higher level of the balance at the beginning of the last period (in order to have the same real balance at the end of the period when the purchase is made). A recursive argument is then applied to all periods during the accumulation process. Note that the length of that process may increase.

This theoretical argument is not in contradiction with the observable behavior of the velocity of money in sub-saharan countries. We have seen that in countries with temporary episodes of significant inflation (such as Nigeria or Zambia before 1986), there is not clear relation between the level of money holdings and inflation.

Even when inflation does not induce a lower level of money balances, it increases the cost of holding money, and the cost of investment and durable goods. The estimation of this excess-burden may not be done with the tools of supply and demand of money balances, since it depends on inefficiencies that arise in other markets. The only conclusion here is that the values of efficiency costs in table 4 are underestimates of the true values.

V.2. Impact on Long-Run Growth

The argument that a reduction of the tax on financial institutions stimulates investment and growth is appealing and has often been mentioned; to be effective, it needs to be buttressed by some numbers. What is the potential for growth that can be delivered by a reduction of the tax burden on financial assets? After the financial liberalizations of Thailand and Indonesia (Chamley and Husain [1989]), most of the growth of financial assets seems to have been generated by substitutions from the foreign and the parallel markets. It did not appear that this growth was due to an increase

of the saving rate (which in this case would have had to increase by 5 points)[24].

Can a weak relation between the rate of return and saving be explained by economic theory ? Yes, and there are two arguments: we all know that the impact of the overall rate of return on the level of saving is ambiguous because of the opposite substitution and income effects. Second, financial assets form only a fraction of total saving, and an increase of their rate of return has only a limited impact on the overall intertemporal rate of return. Assume for example that the level of financial savings is equal to one third of one year's output. If capital is two years output (a low number), financial savings is one sixth of wealth. An increase of the real rate of return on deposits of 12 points (a large number for the liberalizations in South East Asia) would induce an increase of the overall rate of return of only 2 points. Such a computation is obviously a bit rough, but its main purpose is to put these effects in perspective.

Let us make now the extreme assumption for growth that indeed, all new financial assets come from an increase of the flow of saving. The impact of this expansion on output depend on the rate of return to capital. This point is obvious, has been used since cost-benefit exists, but it tends to be a little overlooked in these days of endogenous growth models.

Assume for example, that the real marginal productivity of capital is equal to 25 percent (a relatively large number). If financial deepening increases from say 25 percent of GDP to 50 percent (again not a small effect),

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[24]There is by now a well known controversy about the impact of interest rates in financial markets on the level of aggregate saving. See Giovannini [1985], for the lack of relation, and Fry [1988], for the opposite view.

the increase of output (after five years) is equal to .25 multiplied by .25, i.e. 6.25 percent of GDP, which corresponds to an increase of the growth rate of GDP of 1.5 percent, per annum, for five years. This is not negligible, but still seems short of a true "take-off". In a standard growth model, the impact on growth is transitory, and the impact on the level of the balanced growth path is permanent.

A new literature has emerged recently to diverge from the Solovian framework of diminishing returns which imposed an exogenous constraint on the rate of growth[25]. These works have been motivated by various types of empirical stylized facts which do not seem to fit the Solow model. Mechanisms that are independent from each other have been proposed to explain an endogenous determination of the growth rate. A complete discussion is out of place here, and I will focus briefly on the relation between non human capital accumulation and growth, which is the issue in this paper.

The standard mechanism for endogenous growth here is to assume that there are no diminishing returns in production. We all know that there are diminishing returns at the firm level. The constant returns at the aggregate level are justified by externalities between capital inputs (or output) in the economy. Such process have not been supported yet by hard empirical evidence[26]. The property is represented by an aggregate production function of the type

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[25]Such models are not completely new since they existed at least since the model of learning by doing of Arrow. See Romer [1986] for an introduction, and Easterly [1989] for policy implications.

[26]For a sceptical view about this process of endogenous growth, see the empirical study of Benhabib and Jovanovic [1989].

(7) $Y = AK\theta$,

where A is a constant, and θ is an efficiency parameter that depends on policy. The growth rate of the economy g, is equal to that of capital which is given by the equation

(8) $g = \frac{\Delta K}{K} = \frac{sY}{K} = sA\theta$, where s is the saving rate.

The growth rate now depends on s and θ; policies that affect the saving rate or the efficiency of the economy lead to a higher growth rate. Note that this effect applies to <u>any</u> policy that improves the efficiency of the economy, however trivial the improvement may be.

The crucial assumption here is the constant returns to scale in capital. It does not invalidate the use of the standard tools of cost-benefit: The constant returns to scale in capital imply that for the aggregate, the marginal return of capital is equal to the average return. Empirical estimates of the ratio between output and capital are relatively high, more than 30 percent[27]. It is not surprising that such high numbers would indeed lead to very large benefits of the growth of capital stock through financial deepening. The main conclusion here is that the evidence about a "linchpin" impact of financial taxation on growth needs to rely on a good micro-economic model which is supported by data on very large rates of return of investment or externalities in the growth process.

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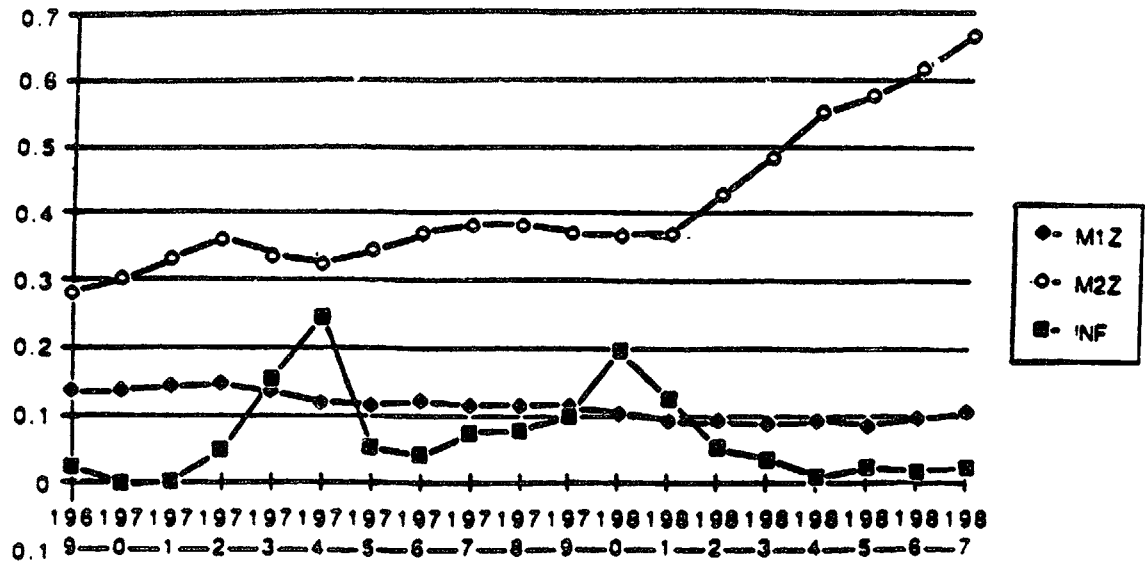
[27]If this ratio is taken for the "new" sector in developing economy, it would be approximated by the inverse of the ICOR.

FIGURE 6a. The Expansion of Bank Deposits in Thailand

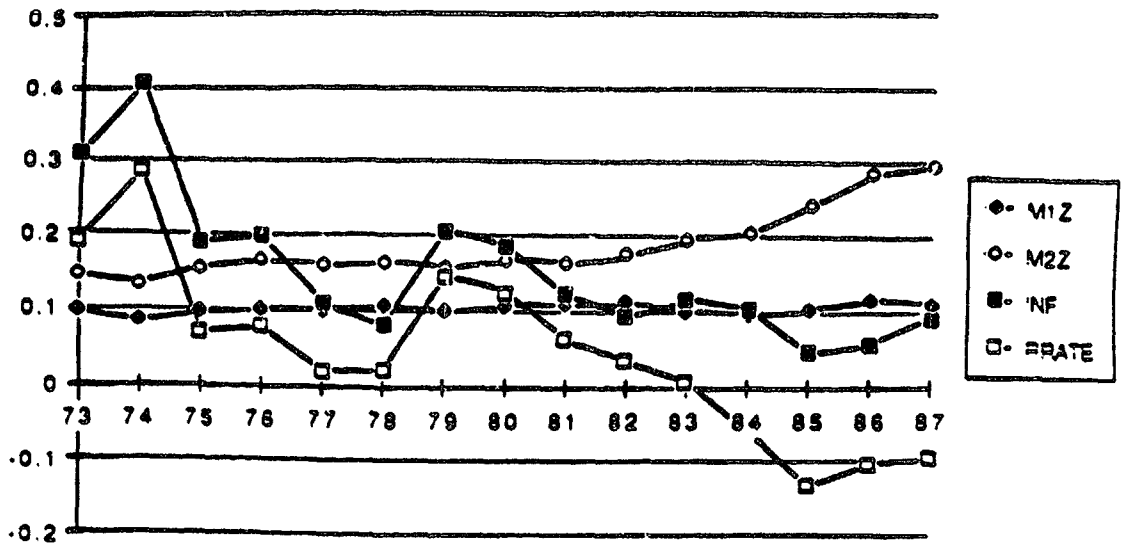


Variables

M1Z M1/GDP
M2Z M2/GDP
INF Inflation rate (CPI)

Source IFS

FIGURE 6b. Financial Deepening and the Real Interest Rate in Indonesia

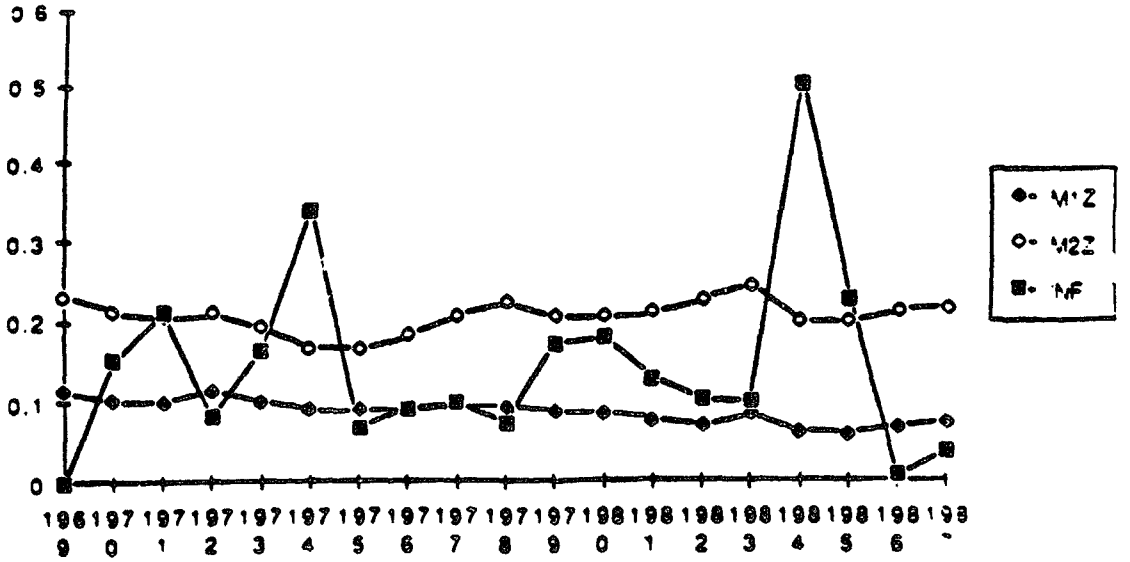


Note

M1Z	M1/GDP
M2Z	M2/GDP
INF	Inflation rate (CPI)
RRATE	Opportunity cost of money: INF - Deposit rate

Data: IFS

FIGURE 6c. Financial Deepening and the Real Rate in the Philippines



VI. CONCLUSION: FINANCIAL LIBERALIZATION AND RECOVERY

As a high level of taxation induces a strong reduction of the level of financial assets, its removal will lead to a large expansion of financial intermediation. Experiences of financial liberalization have been analyzed in numerous previous studies[28], and a discussion is limited here by space. In view of the results of this paper, one point needs to be stressed : in order to be successful, a liberalization must be characterized by a credible policy. Failing this criterion, the removal of taxes cannot be anticipated to be permanent and will have a limited impact on financial expansion.

Two examples of successful liberalization occurred in Thailand and Indonesia, after 1980. These are illustrated by Figures 6a and b. In both cases the rate of inflation was low because of sound macroeconomic policies. The removal of interest ceilings was crucial for the large expansions of financial assets, mainly through inflows from other markets (informal and foreign).

This removal of interest ceilings which is so important in stable macroeconomic environments (with strong possibilities of substitution in informal and foreign markets), is probably not the essential step when the taxation of financial assets is due to internal imbalances. The liberalization in the Philippines (Figure 6c) is a case in point: interest rates were increased, but when inflation soared, the negative real rate on assets stopped domestic financial deepening. A hasty removal of interest rate ceilings which precedes

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[28]See Fry [1988], Chamley and Husain [1989].

economic stabilization may in fact hamper the success of liberalization. This removal increases the burden of the debt for the government and the additional burden may endanger a program towards stability. This argument is developed more fully in Appendix 2.

The structure of markets is somewhat different in Sub-Sahara, but similar lessons can be used: high inflation rates were stopped in Ghana after the introduction of a program of structural adjustment in 1984. However, macro-economic stability was not fully restored and the inflation rate still reached 40 percent in 1987. Although (nominal) interest rates were had increased up to 25 percent, the real rate of return was still negative. This uncertainty seems to have contributed to a very slow financial deepening since 1984 (by 3 percentage points between 1984 and 1987). More work needs to be done on these issues but since heavy financial taxation is often the result of budget deficiencies, it is hardly a surprise that these structural issues should be addressed for a durable recovery.

APPENDIX 1

Computation of Seignorage Revenues

In order to analyze the biases that occur when inflation is not constant, divide one year in two periods of six months. Call y the real annual GDP. Assume that the flow of real GDP is constant over the year, and that the money growth occurs only in the second half of the year. The formula (4) becomes

$$(9) \quad Z = \frac{\Delta M}{\frac{y}{2} + \frac{y}{2}\bar{P}} = \frac{\Delta M}{y(\frac{1 + \bar{P}}{2})} ,$$

where $\bar{P}$ is an average price index over the second half of the year. The actual amount of revenues as a fraction of real GDP, are equal to

$$(10) \quad R = \frac{1}{y}\frac{\Delta M}{P^*} ,$$

where P* is an average of the price level over the second half of the year. The indices $\bar{P}$ and P* are not exactly the same, but they are averages of price levels over the same half-year. The comparison between the two formulae (9) and (10) shows that the first overestimates the true amount of revenues: The money is expanded in the second half-year, and the deflator for the real revenues of money should thus be for the same half-year, as shown in formula (10). But the first formula includes the prices of the first half-year (which are lower) in the computation of the deflator, thus generating a positive bias.

Note that in this example, one would expect the velocity of money to increase in the second half-year (since inflation increases). This effect would induce a higher price increase in that half-period, and thus exacerbate the previous effect. The argument applies *mutatis mutandis* when the rate of money creation decelerates.

The sensitivity of the error to the behavior of the rate of money creation or the velocity of money is tested in Table 1 under the following assumptions. The year is divided in 12 months. The rate of money creation is equal to zero in the first half of the year and then equal to 6 percent per month. The velocity of money is constant in case I, and such that the money to (annual) GDP ratio is equal to 25 percent. In the second case the velocity of money increases by 40 percent during the second half of the year.

Since the bias has the other sign when the the rate of money decelerates, the formula (4) could provide a good measure on average. This is tested here by assuming that the money creation is equal to zero and 6 percent (per months) in alternate months (with constant and changing velocities of money). These are the cases III and IV of the Table, respectively.

Finally, the case V shows the results when the money growth rate is equal to zero and 6 percent in alternate months, and the velocity increases lag systematically one months behind the money expansions. One can see that the bias can be very sensitive to the structure of lags between money and price expansions.

TABLE 2

EXAMPLES OF COMPUTATION OF SEIGNORAGE REVENUES

	ΔM/M (1)	inf (2)	R/y (3)	Meas. 1 (5)	Meas. 2 (4)
I	42	42	8.4	9.6 (13%)	9.3 (10%)
II	42	56	7.7	9.6 (51%)	8.8 (15%)
III	42	70	7	13.2 (87%)	8.4 (19%)
IV	42	84	6.5	14.5 (123%)	8.0 (23%)
V.	1039	2405	6.1		7.7 (26%) (6.5%)*

All numbers are in percentages.

Definitions

I to IV. The money growth is equal to 0 % in the first six months of one year, and to 6% (per month) in the second half of the year. The velocity of money is constant in the first half of the year. It increases in the second half of the year by 0% (I), 10% (II), 20% (II), and 320% (III).

IV. In six consecutive years, money growth is equal to 50 percent per year, and all the growth occurs in the second half of each year. Before the first increase the velocity is equal to the base case (say 100 - in fact 3.3 when GDP is computed on an annual basis). After the first increase of money, velocity increases to 120, until the next money expansion when it increases to 140, and so on up to a value of 220.

Results

The value of R/y is the value of the standard formula averaged over the six years. The computation for Methods on and two (see the text), are in the last two columns. The errors with respect to the true value (in percentage) are in parenthesis.

* This number refers to the error (in percentage), when the standard formula is applied to the whole span of six years and is defined by

$$REV = (M_6 - M_0)/(Y_1 + \ldots + Y_6) ,$$

where Y_i is the nominal GDP in year i.

Other Financial Assets

The previous discussion applies to the other items of the base for financial taxation. When the asset pays interest income, the amount of cash revenues is equal to the difference between (i) expansion of the nominal quantity of the asset (such as demand or time deposit), deflated by a price index, and (ii) the nominal interest income of the asset:

$$(11)\quad R = \frac{\Delta M - iM}{P} ,$$

or as a fraction of real GDP,

$$(12)\quad R = \frac{\Delta M - iM}{Y}$$

This formula is subject to the same caveat as the one for seigniorage. Its is straightforward when the menu of deposit and of interest rates is simple. This is the case of the sub-saharan countries between 1980 and 1986: demand deposits did not earn an interest income, and the interest rate on time deposits was almost constant for most countries. The relevant data for countries that have used a inflation tax (with a rate higher than 20 percent on average between 1980 and 1986) is presented in Table 3.

APPENDIX 2

Interest Ceilings and Stabilization

The argument of the previous section applies in a world which is stationary and where the policy goal is to extract a steady flow of revenues from the financial sector by the least inefficient method. It does not take into account the context in which the taxation of financial assets becomes an important source of revenue for a government. In the sub-saharan countries that have not been subject to policy restrictions such as in the CFA zone, the revenues from the taxation on financial assets has been subject to large fluctuations.

Stylized features of financial taxations in fiscal crises are that they occur discontinuously: in normal periods the government is able to meet its obligations through standard taxes, and the tax burden of the financial sector is low. The financial assets form a base that is easy to tax. Furthermore this taxation is efficient in the short-run because it is *per se* equivalent to a lump-sum tax. However, a tax on financial assets may have also a strong effect on financial saving in the future even if the government never expects to repeat this tax. The taxation of financial institutions often carries with it the signal that such policy will be repeated in the future (consider Ghana). This signalling effect has prevented many governments from imposing capital levies on the financial sector.

The first effect of a fiscal crisis is an increase of the quantity of money and of the inflation rate. The anticipation of this event induces an increase of the nominal interest rate, which in turn means a higher debt

service for the government. It is in this context that interest ceilings can provide a useful instrument for policy.

To present the argument we can observe that in a situation of free market, the interest elasticity of the demand for deposits (the supply of funds at banks), is lower than the interest elasticity of the demand for government loans by banks. This fact is supported by theoretical reasoning and empirical evidence. To simplify the discussion, we can emphasize this by assuming that the supply of deposits by individuals is fixed and independent of the (expected) inflation rate.

In this simple framework, there is no uncertainty except that presented by the inflation policy of the government; therefore in a free market banks should lend to the government and the private borrowers at the same interest rate. Assume now that banks and borrowers (entrepreneurs) both expect a financial crisis to occur next year with a probability s, and that if a crisis occurs, the inflation rate is equal to π. In a free market the nominal one year interest rate is then equal to the sum of the real rate r* and of the product $s\pi$: $i = r^* + s\pi$. In particular, this is the interest rate that the government has to pay on its debt (next year). One could argue that a higher interest on the debt is not inefficient since it represents a transfer between individuals. However, the debt service is financed taxes which entail a social cost because of price distortions and administration.

A solution to this problem is to impose a ceiling equal to r* on nominal interest rates. This policy is not a cure to the problem of time-consistency because it does not force a government to be honest (i.e. not to use inflation next year). The interest ceiling is a device that forces individuals to behave as if they believed that the government is honest.

What are the implications of the policy for the loan market? The supply of funds for private borrowers is equal to the difference between deposits and government bonds. Assume first that there is no government intervention. The nominal interest rate is equal to $i = r^* + s\pi$. When the government puts a ceiling equal to r^* on the nominal rate, the expected real cost of funds for borrowers is equal to $r^*-s\pi$. The demand for loans increases; since the supply is fixed, rationing occurs. The effects of this rationing on efficiency depend on its mechanism. In the present model with no uncertainty, borrowers may use resources to capture the rationing rents. The maximum amount of rent seeking is equal to the product of the interest gap $s\pi$ and of the amount of loans to the private sector, L. Note however that this is an upper bound of the cost and that other rationing rules could lead to much smaller costs.

The efficiency gain of the ceiling is equal to the product $s\pi G\nu$, where G is the level of the government debt and ν is the efficiency cost of taxation. The comparison of the benefits and the cost shows that the policy may be efficient even is private borrowers spend all possible resources to attempt to capture the rationing rents. A sufficient condition for efficiency in this case is that the product of the marginal efficiency cost of taxation and of the government debt is greater than the level of private loans. This is a realistic situation: for example, is the the marginal efficiency cost of taxation has the plausible value of 50 percent, the interest ceiling is efficient when the government borrowing from financial institutions is at least equal to twice the amount of private loans.

The analysis can be extended to an economy with micro-risks. In such an economy, the ceiling implies a distortion because it reduces the incentive for

loans to risky projects (Section IV.1.c). The magnitude of this effect depends on the return properties of each project and on the distribution of these projects. An upper bound for the social efficiency cost is given again by product $s\pi L$ which is the same expression as in the previous case. The comparison between the benefits and the costs of the policy follows in the same way.

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